EXTENSION NOTE

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NELSON FOREST REGION

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Case Study: Using Partial-Cutting Timber-Harvesting Methods in a Sensitive Watershed in Southeastern British Columbia

Carol Andrews

- **By using a combination of partial-cutting silvicultural systems, a Licensee will be able to access high-quality timber in an area that has a complex combination of water quality, viewscape, forest health, and wildlife concerns.**
- **Layout costs are significantly higher than for conventional harvesting methods, and tree-to-truck costs are expected to be higher too; the financial and operational viability of this trial are being scrutinized.**

INTRODUCTION

Since the introduction of the Forest Practices Code in 1995, timber Licensees throughout British Columbia (BC) have been adjusting to the challenges of meeting legislative and regulatory requirements while remaining economically viable. This Extension Note describes how one Licensee in southeastern British Columbia, Kalesnikoff Lumber Co. Ltd., is utilizing an innovative set of partial-cutting methods to harvest high-quality timber in an area with complex social, economic, and environmental resource values.

Kalesnikoff Lumber operates a mill and woodlands division from the rural community of Thrums, near Castlegar, in the Nelson Forest Region.

SITE DESCRIPTION AND SIGNIFICANCE

In January 2000, Kalesnikoff Lumber received approval to harvest Cutting Permit 60 (CP 60), a 530-ha site located approximately 20 km southwest of Nelson off the Rover Creek and Midslope Forest Service Roads. The lower elevations of the development lie within the dry warm subzone of the Interior Cedar Hemlock biogeoclimatic zone, and the upper elevations lie within the Columbia-Shuswap variant of the moist warm subzone. The variable terrain encompasses moderately steep slopes, benchlands, and minor areas of potentially unstable terrain.

The stands in the area are fire origin and comprise the typical species mix for this subzone, including cedar, hemlock, larch, western white pine, spruce, Douglas-fir, grand fir, sub-alpine fir, ponderosa pine, trembling aspen, paper birch, and some pure lodgepole pine stands. Timber volumes are highly variable, ranging from a low of 150 m^3/ha in the pure lodgepole pine stands, up to 500 m^3/ha in the mixed stands. The lodgepole pine stands are experiencing endemic levels of mountain pine beetle. Douglas-fir bark beetle infestations are sporadic, but appear to be increasing in the general area. *Armillaria* root disease is prevalent throughout the development area.

PLANNING OBJECTIVES

Kalesnikoff Lumber's harvesting plans include the following objectives, which are intended to address issues related to both resource values and economics:

1. Meet Visual Quality Objectives of Partial Retention within a Class 1 Scenic Area, as defined under the *Kootenay Boundary Land-Use Plan—Implementation Strategy* (Nelson Forest Region 1997).

2. Maintain water quality, quantity, and timing within the Rover Creek and Bird Creek community watersheds.

3. Develop silvicultural and harvesting systems that maintain and enhance wildlife habitat, particularly ungulate winter range.

4. Develop timber supplies required to meet the winter fibre requirements of Kalesnikoff Lumber's processing facility.

CRITICAL PLANNING ISSUES

Water Quality and Quantity

Managing and protecting the water resource are primary concerns to the local water users, as represented by the Blewett Watershed Com-

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mittee. Sedimentation has been identified as a critical issue in the development area. Examples of both natural and man-induced landslides exist in this watershed, so there is great concern that the risk of landslides be minimized. As well, area residents are concerned about rates of harvest and the relationship between harvesting and water quality.

In response to these concerns, Kalesnikoff Lumber has established monitoring stations on Bird Creek to monitor sediment changes, movements, aggregations, and degradations along the length of the creek. A control station has been set up on Anderson Creek, a hydrologically similar basin located within a protected area (West Arm Park). The development plans for CP 60 include a proposed 20% maximum Equivalent Clearcut Area (within the Bird Creek Community Watershed), which is considered the threshold between low risk and potentially moderate risk to water quality within this watershed (BC Ministry of Forests and BC Ministry of Environment 1999).

Also, the company has committed to distributing harvesting activities over a three-to-five year period, thereby dissipating the rate of harvest. The gradual implementation of the development will provide opportunities for an adaptive management approach, thereby allowing for revisions to the proposal if negative channel impacts are detected.

Viewscapes

Because CP 60 is highly visible from Highway 3A and from nearby subdivisions and rural residences, harvest planning had to consider the maintenance of viewscapes.

Visual management issues have been addressed by employing a group-selection silvicultural system to harvest most of the site (average openings are <1 ha). These openings are oriented along contours and utilize the screening effects of downslope mature trees to minimize visual impacts. The yarding corridor widths (average 7 m on cable-harvesting terrain) are also minimized to achieve acceptable levels of modified visual conditions (Figure 1).

Forest Health

Mountain pine beetle is endemic in CP 60. Therefore, Kalesnikoff Lumber is managing the lodgepole-pine component by applying an irregular shelterwood system (lodgepole pine removal only) to those stands with higher components of pine (Block 3). It is expected that approximately 50% of the total basal area will be removed as part of this harvesting strategy. Some areas where pure lodgepole pine stands exist will be clearcut, while other areas will require minimal harvesting due to higher components of Douglas-fir and larch. Although the piece size of the pine stems is relatively small, targeting of susceptible lodgepole pine stands is considered a proactive approach to managing pine-beetle infestations in the planning area.

Armillaria ostoyae is prevalent in the Rover Creek area. Previous partial cutting, spacing treatments, and firewood cutting appear to be encouraging a conversion to more shade-tolerant species (western redcedar, western hemlock, grand fir). The move to group-selection harvesting is seen as an opportunity to allow for reforesting the stand with more shade-intolerant species. Reforestation will be undertaken utilizing a mix of species that are considered more resistant to Armillaria, including ponderosa pine, blister-rust-resistant white pine, and western larch. Stumping and pushover harvesting treatments were considered within the openings, but were eliminated in light of perceived concerns for protecting water quality within the community watersheds.

Wildlife

Although CP 60 was not originally designated as a winter-range unit for ungulates when planning began, Kalesnikoff Lumber recognized the area's potential. The company proposed that some south-facing slopes provide suitable aspects and stand attributes to be considered for winter-range designation.

Using a group-selection silvicultural system in CP 60 could improve the winter-range habitat for ungulate by increasing forage while retaining forested areas for cover, although there is some concern that the proposed silvicultural systems will fragment the ungulate's winter-range area. A monitoring program has been established within the development area to assess whether the area is used by ungulates in the winter.

Timber Supply

CP 60 is a critical area to Kalesnikoff Lumber because of the high quality of timber found there. It is also critical because it is one of the few sites among the company's

Figure 1. Perspective view simulation of CP60 from the Bonnington community. (Large block at left is an existing clearcut on private land.)

operational areas where harvesting can be undertaken in winter, which is important for ensuring a steady, year-round flow of wood to the Kalesnikoff mill.

DESCRIPTIONS OF THE HARVESTING AND SILVICULTURAL SYSTEMS

After carefully considering the above resource management issues, Kalesnikoff Lumber decided to use a variety of silvicultural and harvesting systems within CP 60, including group-selection, patch cutting, clearcutting with reserves, single-tree selection, and irregular shelterwood systems. However, a group-selection silvicultural system is the prevalent system employed in the harvestable areas.

In a group-selection silvicultural system the average size of individual openings is <1 ha, and these openings are evenly distributed over the development area. As well, group-selection harvesting requires a minimum of three stand entries over the term of the rotation to encourage an uneven-aged stand structure (BC Ministry of Forests and BC Ministry of Environment 1995).

Harvesting will be accomplished using a combination of cable-yarding and ground-skidding systems. Some of the harvest units will be ground skidded, but the majority will be harvested utilizing cable systems. A 10-ha area containing windthrow adjacent to a previously harvested area will be clearcut. As well, an irregular shelterwood system will be employed within a 10-ha block where all mature ponderosa pine will be retained. Stand density will be controlled over time through such activities as spacing and/or periodic burning, as the attributes within this block make it a good candidate for recreating fire-maintained ecosystems.

PLANNING, LAYOUT, AND HARVESTING STRATEGIES

The complexity of the harvest system did not fit with standard cruise and appraisal methodologies in place at the time of development. As a result, Kalesnikoff Lumber and the BC Ministry of Forests agreed on a modified cruise plan for the group-selection openings. The cruise compilation summarized the plots that fell inside the group harvesting units separate from the plots that fell outside the harvestable areas. In each case, the plots were then further stratified by stand type. Volumes calculated within the harvestable areas were compared to volumes from areas that fell outside the harvestable blocks and the results showed no significant differences in plot volumes.

Kalesnikoff Lumber estimated that the layout of the group-selection system located on the cable-harvesting terrain was three to four times more costly than conventional clearcutting. The following had to be considered:

- All corridors, tailholds, and intermediate support trees (which will be used in future passes), and gullies had to be accurately located and marked
- All possible windthrow issues had to be identified with respect to block orientation and operational constraints (yarding to be done laterally, away from windthrow areas).
- Individual units, tailhold trees, intermediate supports, and cable corridors all had to be located using GPS technology.

REFORESTATION

Group-selection systems allow the company greater flexibility in regenerating a mixed-species stand than would have been provided using a shelterwood or classic selection system that can favour the regeneration of shade-tolerant species. The brush hazard, typically high in the area, is expected to be reduced by the use of small harvesting openings.

Also, once the trees are established, regeneration will not be disturbed during future passes (except in cable corridors), which is a problem more commonly associated with single-tree selection systems. Reforestation costs per hectare are expected to be somewhat higher than normal due to the extra time required to access the individual openings distributed across the area.

COSTS

The cost to undertake conventional layout normally ranges from $1.50 to 2.00/m^3. The company's costs have reached upwards of $4.50/m^3 for layout of this area. Additionally, tree-to-truck rates are expected to range from $35 to 40/m^3 for the cable-harvested, group-selection areas.

SUMMARY

The use of innovative approaches allows a Licensee access to timber that would not be available through conventional methods because of thresholds and constraints applied to protect other resources. Kalesnikoff Lumber operates almost exclusively in areas with community and domestic water values and high visual sensitivities. If Kalesnikoff Lumber is to continue to achieve its allowable annual cut in its present operating areas, innovation will be required. CP 60 is also a trial for the company with regard to the financial and operational viability of this approach. Kalesnikoff Lumber hopes to use CP 60 as a demonstration of various harvesting options when proposing new developments in sensitive areas.

Given the complexity of practicing forestry in the realm of social, environmental, and economic values, silvicultural systems are likely to become even more complex over time. It is essential that the BC Ministry of Forests, Licensees, and other reviewing agencies work together to resolve and clarify policy interpretations around alternative systems, and that they continue to develop better mechanisms to evaluate such proposals.

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FOR FURTHER INFORMATION, CONTACT:

Stan Hadikin, RPF
Development Forester
Kalesnikoff Lumber Company Ltd.
250-399-4211 stanh@kalesnikoff.com

Deb DeLong, RPF
Silviculture Systems Research Forester
Nelson Forest Region, BCMOF
250-354-6285 debbie.delong@gems6.gov.bc.ca

Visit Nelson Forest Region's Forest Sciences website at www.for.gov.bc.ca/nelson/research/homepage.htm